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ABSTRACT:

PURPOSE: To produce a gold material useful for ornaments, electronic parts, use in the field of medical care, etc., by adding specific amounts of Sm to Au and further adding specific amounts of one or more elements among Co, Ni, etc.

CONSTITUTION: A gold alloy is constituted by adding 10-3000ppm of Sm to Au and further adding and incorporating 10-3000ppm, in total, of one or more elements among Co, Ni, Fe, Sn, In, Cu, Si, Zn, Ce, and Ga. Moreover, the content of Au is regulated so that it is not lower than 99.5wt.% even if impurities other than the above are contained. By this method, the gold material, having corrosion resistance and luster practically equal to those of pure Al, increased in hardness and mechanical strength, and remarkably improved in mechanical properties in the case in which additive quantities are increased, can be provided.

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(54)【発明の名称】 金合金

(57)【要約】

【目的】 強度が高くしかも耐蝕性、展延性に優れ、純Auの色調および品位のある金合金を得ることを目的とする。

【構成】 Auに、S_mを10～3000ppm添加し、さらにCo, Ni, Fe, Sn, In, Cu, Si, Zn, Ge, Ga の中の一種以上の元素を合計10～3000ppm添加含有させたことを特徴とする。

【特許請求の範囲】

【請求項1】 Auに、Smを10～3000ppm添加し、さらにCo、Ni、Fe、Sn、In、Cu、Si、Zn、Ge、Ga の中の一種以上の元素を合計10～3000ppm添加含有させたことを特徴とする金合金。

【請求項2】 Auに、Smを10～3000ppm添加し、さらにCo、Ni、Fe、Sn、In、Cu、Si、Zn、Ge、Ga の中の一種以上の元素を合計10～3000ppm添加含有し、その他不純物を含んでも、Au成分が99.5重量%以上であることを特徴とする金合金。

【発明の詳細な説明】

【0001】

【産業上の利用分野】本発明は、Auに少量の元素を含有させて硬度を高くした金合金に関する。

【0002】

【従来の技術】Auは耐蝕性、展延性に優れ、その色彩の優雅さもあって宝飾用品として使用されているが、その性質から電子部品や医療分野等の広い範囲でも有用な材料として用いられている。

【0003】

【発明が解決しようとする課題】しかし、純Auは一般に非常に柔軟であり、硬さや機械的強度が低いために表面に傷が付き易く、変形し易いという問題があり従来から多くの金合金が開発されているが、そのいずれにおいても純Auの色調が失われたり、金の品位が低下したりする問題がある。

【0004】

*【課題を解決するための手段】そこで本発明は、Auに、Smを10～3000ppm含有させて主添加元素とし、これにさらに添加した効果を高めるためにCo、Ni、Fe、Sn、In、Cu、Si、Zn、Ge、Ga の中から一種以上を副添加元素とし、これらを10～3000ppm含有させて成るものである。

【0005】Smを主添加元素とした理由は、鑄造後および加工後における硬さを向上させるためであり、副添加元素であるCo、Ni、Fe、Sn、In、Cu、Si、Zn、Ge、Ga は、Smと比較的融点の高い化合物を生成し、溶解時のSmの飛散抑制と共にSmとの相乗効果による硬さを向上させることとなる。添加量を各々10～3000ppmとしたのは、10ppm未満では硬さの向上に効果が少なく、3000ppmを超えると硬くなり過ぎて脆さがでるからである。

【0006】また、不純物元素および上記添加元素合計が5000ppmを超えると金の品位の低下をきたし、色調においてもいわゆる純Auのもつ黄金色を失うことになる。

【0007】

20【作用】以上の本発明によると、純Auに比べて鑄造後の硬さが向上し、また、板材や線材等の加工等の塑性加工においては加工硬化による硬さの上昇が大きくなり、しかも金の品位および色調を保つことができる。

【0008】

【実施例】本発明の実施例を表1および表2に示す。

【0009】

* 【表1】

実施例	組 成 p p m	硬 さ (Hv)	
		鑄造材	強加工材
1	Au-3000Sm-960Ni-680Cu-360Zn	90	133
2	Au-3000Sm-1340Sn-660Co	90	130
3	Au-1000Sm-1000In-1000Sn-1000Zn	86	118
4	Au-2000Sm-500Si-500Ge	90	131
5	Au-1500Sm-780Ni-720Zn	85	121
6	Au-1000Sm-330Si-670Co	82	126
7	Au-1000Sm-200Si-800Ni	83	122
8	Au-1000Sm-240In-760Ga	75	109
9	Au-1000Sm-590Ni-410Ge	77	110
10	Au-525Sm-975Co	70	105
11	Au-510Sm-990Ni	72	108
12	Au-450Sm-1080Sn	70	105
13	Au-450Sm-550In	64	101
14	Au-210Sm-790Cu	60	100
15	Au-150Zn-850Sm	58	97

【0010】

50 【表2】

実施例	組 成 p p m	硬 さ (H v)	
		鋳造材	強加工材
16	Au-780Sm-220Ge	55	90
17	Au-520Sm-480Ga	55	90
18	Au-840Sm-160Si	60	96
19	Au-576Sm-224Fe	58	91
20	Au-184Sm-616Co	55	93
21	Au-300Sm-270Cu-180Zn	52	90
22	Au-290Sm-210Ge	50	90
23	Au-370Sm-130Ga	50	88
24	Au-150Sm-175In-175Sn	50	87
25	Au-100Sm-114Cu-86In	49	85
26	Au-50Sm-48Ga-22Zn	47	85
27	Au-50Sm-35Cu-15Sn	47	85
28	Au-50Sm-25Fe-25Co	58	91
29	Au-42Sm-8Si	45	86
30	Au-364Sm-6Ge-8Sn	45	83
従来例	純Au	25	75

【0011】なお、比較のために純Auを従来例として示す。表1および表2に示す試料は、まず、実施例に示す添加元素であるSmを主元素とした合金をアーク溶解にて鋳造して母合金とした。つぎに、純Auに表1および表2の実施例に示す組成でこの母合金を配合し、上記同様アーク溶解を行い、厚さ10mm、幅30mm、長さ50mmのケーキ状の鋳造体とし、この鋳造体を、熱間鋳造で線

【0012】その結果、表1および表2で明らかなよう*

*に、実施例1～30は従来例としての純Auに比べて硬さが硬いことがわかる。

【0013】

【発明の効果】以上詳細に説明した本発明によると、Auと称呼できる程の微量な添加元素組成でも純Auに比べてほぼ同等の耐蝕性と光沢をもち、硬さや機械的強度が高く、また、添加量の多い場合は飛躍的に機械的特性の上昇があり、宝飾用をはじめ電子部品、医療分野等にまで広い範囲で有用な金属材料とすることができる。

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1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention relates to the gold alloy which Au was made to contain a little element and made the degree of hardness high.

[0002]

[Description of the Prior Art] Although Au is excellent in corrosion resistance and plasticity, also has the grace of the color, and considers as a jewelry supply and it is used, it is used as a useful ingredient also in the large range, such as electronic parts and the medical field, from the property.

[0003]

[Problem(s) to be Solved by the Invention] However, although pure Au is generally very flexible, a blemish tends to be attached to a front face, there is a problem of being easy to deform and many gold alloys are developed from the former since hardness and the mechanical strength are low, there is a problem to which the color tone of pure Au is lost or golden grace falls also in the any.

[0004]

[Means for Solving the Problem] Then, this invention is 10-3000 ppm about Sm to Au. They are Co, nickel, Fe, Sn, In, Cu, Si, Zn, germanium, and Ga in order to heighten the effectiveness which was made to contain, used as the main alloying element, and was further added to this. More than a kind is used as a suballoying element from inside, and it is 10-3000 ppm about these. It is made to contain and changes.

[0005] The reason for having used Sm as the main alloying element is Co, nickel, Fe, Sn, In, Cu, Si, Zn, germanium, and Ga which are for raising the hardness after casting and processing, and are a suballoying element. Sm and a compound with the comparatively high melting point are generated, and the hardness by the synergistic effect with Sm is made to improve with scattering control of Sm at the time of the dissolution. It is 10-3000 ppm respectively about an addition. Having carried out is 10 ppm. At the following, improvement in hardness has little effectiveness, and it is 3000 ppm. It is because it will become hard too much and brittleness will come out, if it exceeds.

[0006] Moreover, an impurity element and the above-mentioned alloying element sum total are 5000 ppm. If it exceeds, deterioration of golden grace will be caused, and the golden color which the so-called pure Au has also in a color tone will be lost.

[0007]

[Function] According to the above this invention, the hardness after casting improves compared with pure Au, and the rise of the hardness by work hardening becomes large in plastic working, such as processing of a plate, a wire rod, etc., and, moreover, golden grace and a golden color tone can be maintained.

[0008]

[Example] The example of this invention is shown in Table 1 and 2.

[0009]

[Table 1]

実施例	組 成 p p m	硬さ (H v)	
		鑄造材	強加工材
1	Au-3000Sn-960Ni-680Cu-360Zn	9 0	1 3 3
2	Au-3000Sn-1340Sn-660Co	9 0	1 3 0
3	Au-1000Sn-1000In-1000Sn-1000Zn	8 6	1 1 8
4	Au-2000Sn-500Si-500Ge	9 0	1 3 1
5	Au-1500Sn-780Ni-720Zn	8 5	1 2 1
6	Au-1000Sn-330Si-870Co	8 2	1 2 6
7	Au-1000Sn-200Si-800Ni	8 3	1 2 2
8	Au-1000Sn-240In-769Ga	7 5	1 0 9
9	Au-1000Sn-590Ni-410Ge	7 7	1 1 0
1 0	Au-525Sn-975Co	7 0	1 0 5
1 1	Au-510Sn-990Ni	7 2	1 0 8
1 2	Au-450Sn-1000Sn	7 0	1 0 5
1 3	Au-450Sn-550In	6 4	1 0 1
1 4	Au-210Sn-790Cu	6 0	1 0 0
1 5	Au-150Zn-850Sn	5 8	9 7

[0010]

[Table 2]

実施例	組 成 p p m	硬さ (H v)	
		鑄造材	強加工材
1 6	Au-780Sn-220Ge	5 5	9 0
1 7	Au-520Sn-480Ga	5 5	9 0
1 8	Au-840Sn-160Si	6 0	9 6
1 9	Au-576Sn-224Fe	5 8	9 1
2 0	Au-184Sn-616Co	5 5	9 3
2 1	Au-300Sn-270Cu-180Zn	5 2	9 0
2 2	Au-290Sn-210Ge	5 0	9 0
2 3	Au-370Sn-130Ga	5 0	8 8
2 4	Au-150Sn-175In-175Sn	5 0	8 7
2 5	Au-100Sn-114Cu-86In	4 9	8 5
2 6	Au-50Sn-48Ga-22In	4 7	8 5
2 7	Au-50Sn-35Cu-15Sn	4 7	8 5
2 8	Au-50Sn-25Fe-25Co	5 8	9 1
2 9	Au-42Sn-8Si	4 5	8 6
3 0	Au-364Sn-6Ge-8Sn	4 5	8 3
従来例	純Au	2 5	7 5

[0011] In addition, pure Au is shown as a conventional example for a comparison. The sample shown in Table 1 and 2 cast the alloy which used as the main element first Sm which is the alloying element shown in an example in the arc dissolution, and used it as the hardener. next, pure -- this hardener was blended with Au by the presentation shown in the example of Table 1 and 2, the arc dissolution was performed like the above, and it considered as the casting object of the shape of a cake with the thickness of 10mm, a width of face [of 30mm], and a die length of 50mm, and it formed in the object for lines, and plates by casting between heat, it was processed to the predetermined configuration, and this casting object was made into the sample.

[0012] consequently, examples 1-30 are pure as a conventional example so that clearly [in Table 1 and 2] -- compared with Au, it turns out that hardness is hard.

[0013]

[Effect of the Invention] According to this invention explained to the detail above, compared with pure Au, it has almost equivalent corrosion resistance and gloss also by alloying element presentation [minute amount / like Au and nominal *****], when hardness and a mechanical strength are high and an addition has them, there is a rise of a mechanical property by leaps and bounds, and the object for jewelry can be begun and it can consider as a useful golden ingredient in the large range at electronic parts, the medical field, etc. [many]

[Translation done.]